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PHYSICAL ASPECTS OF SOVIET SECOND GENERATION OPERATIONAL ICBM COMPLEXES

DEPLOYMENT SYSTEM II

CIA/RR EM KH 62-1

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FOREWORD

This report is one of a series under preparation by the Office of Research and Reports, designed to provide a consolidated review of information on the physical aspects, construction, manning, equipping, and operation of deployed Soviet ICBM complexes. KEYHOLE photography has confirmed launch areas of 4 different configurations at 17 ICBM complexes in the USSR. Several of the most extensive complexes are composed of more than one type of launch area.

Because of the number and diversity of the configurations of launch areas identified, arbitrary designations will be used in this series of reports as indicated below; the numbers have been assigned chronologically in keeping with the order of first appearance of these systems, both at Tyuratam and in the field.

Deployment System I (DS-I) - launch areas for the first-generation (SS-6) ICBM -- operational in 1960 -- consisting of a single, rail-served launch pad.

Deployment System II (DS-II) - soft, road-served launch areas -- operational in late 1961-early 1962 -- for the second generation (SS-7) ICBM.

Deployment System III (DS-III) - launch areas characterized during construction by a large excavation, probably involving hardening of the launcher. Initial construction at operational sites of this type began in early 1961. (There has been no determination as to the specific type of ICBM deployed at this type of launch area.)

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Deployment System IV (DS-IV) - a new type of soft, road-served launch area, first observed in early 1962. (The early stage of construction of these launch areas precludes making a determination as to the specific type of ICBM to be deployed.)

This report is concerned with the DS-II configuration, and includes discussion of the primary elements of the deployed complex -- the support base, the rail-to-road missile transfer point, and the launch areas.

Appended at the end of this report is a list of selected documents which contain details on individual ICBM complexes.

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ILLUSTRATIONS

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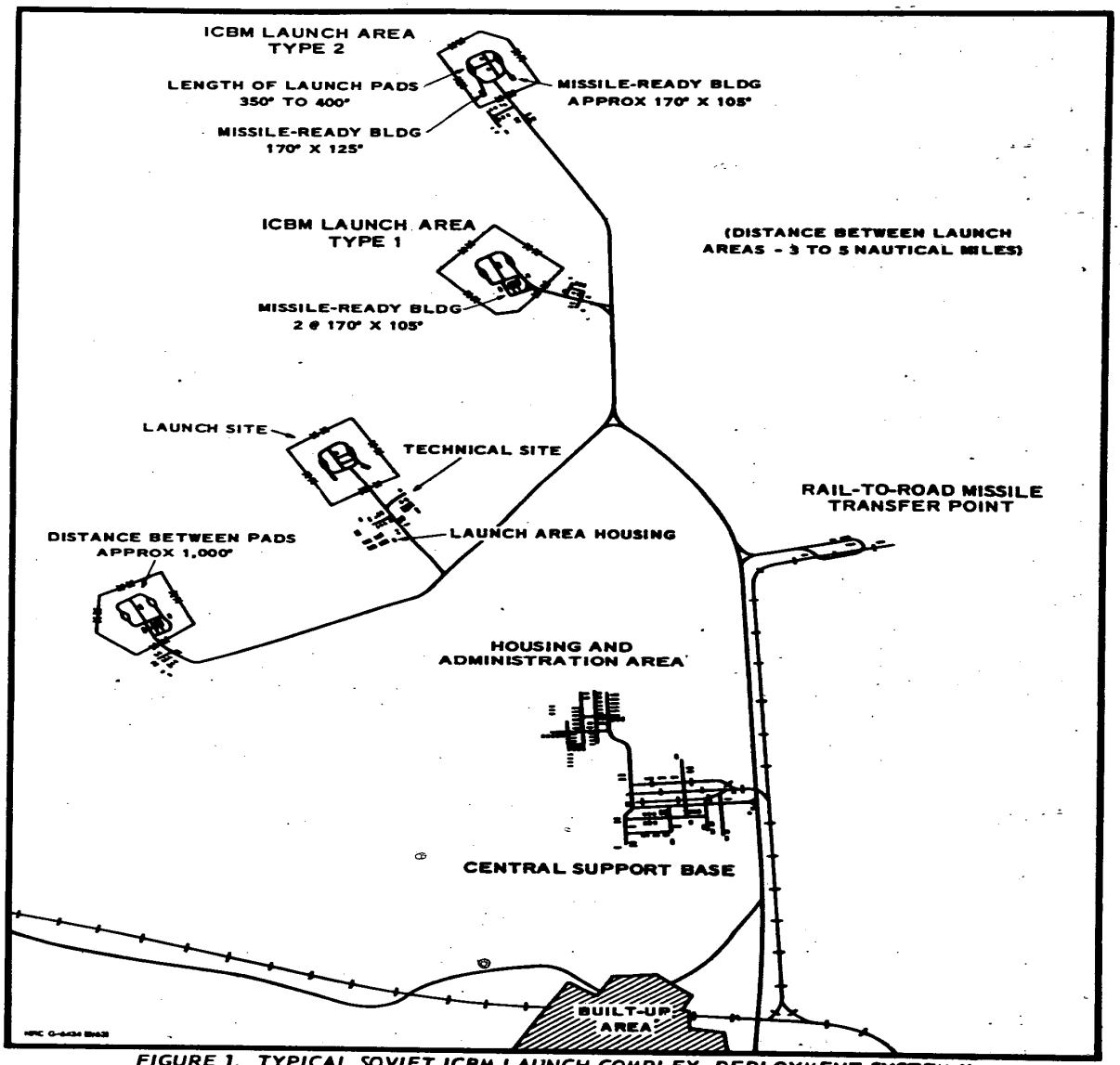

FIGURE 1. TYPICAL SOVIET ICBM LAUNCH COMPLEX, DEPLOYMENT SYSTEM II.

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PHYSICAL ASPECTS OF SOVIET SECOND GENERATION OPERATIONAL ICBM COMPLEXES: DEPLOYMENT SYSTEM II*

SUMMARY

Twelve ICBM complexes containing Deployment System II (DS-II) launch areas have been identified in the USSR from KEYHOLE photography. Similarities between these launch areas and Launch Area C at Tyuratam indicate that they are designed for the SS-7 (Category B) ICBM. In addition to the launch areas, the primary elements of these complexes are a support base and a rail-to-road missile transfer point, as shown in the diagram of a typical DS-II launch complex in Figure 1. The relationships of these elements and their probable functions are indicated by the physical facilities within each and by the road and rail networks, combined with collateral information on Soviet operations.

As many as five road-served DS-II launch areas, which represent a soft deployment mode, have been identified at a single complex. Each launch area contains the following three basic elements: a launch site, a technical site, and a housing unit. The launch site contains two launching positions consisting of flat concrete pads approximately 350 to 400 feet long and approximately 1,000 feet apart. The existence of a technical site located off the access road to the launch area is indicated by information from reliable collateral sources and is confirmed by photography. This facility probably serves as the initial checkout facility for the missile. The mating of the warhead to the missile is performed either at the technical site or in the missile-ready and prelaunch storage buildings behind the launch pads.

A basic modification in the configuration of the DS-II launch sites appears to have occurred early in the program. Two types of launch sites have been identified, with the principal difference apparently in the position-

*The estimates and conclusions in this report represent the best judgment of this Office as of 1 August 1962.

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ing of the two missile-ready and prelaunch storage buildings, as shown in the sketch of typical DS-II launch areas in Figure 2. Five sites have been identified where the two missile-ready and prelaunch storage buildings are parallel drive-through buildings situated on a concrete apron along the center road. These sites have been assigned the designation of Type 1.* At all other DS-II sites a building or a clearing for a building has been observed to the rear of each launch pad. These sites have been assigned the designation of Type 2. All Type 1 sites were identified at launch complexes that were in an advanced stage of construction or complete at a time when construction of Type 2 sites was still in a relatively early stage.

The location of the support base, which is not unique to DS-II, does not appear to be affected by considerations of security. This factor and the absence of identifiable rail-and road-served missile-handling facilities within the support base indicate that it is not involved in weapons handling or checkout. This facility appears to serve primarily as a logistic and maintenance center for the general operation of the complex and, during the construction stage, to serve as a base for building materials and supplies.

Both rail and good-quality road connect the support base and rail-to-road missile transfer point. The simplicity of the transfer point indicates that its primary function is the secure transfer of missiles and probably propellants from rail to the service road of the complex.

A. General Description

1. Location

Twelve complexes containing DS-II launch areas are located in rail-served, forested areas of the USSR within 40 nautical miles (nm) of a city of at least 50,000 population. The majority have been identified in the European and Central Siberian regions between 55 and 60 degrees north latitude, although those complexes identified later have appeared to the

*Types "1" and "2" as used in this report are consistent with the nomenclature of current National Estimates.

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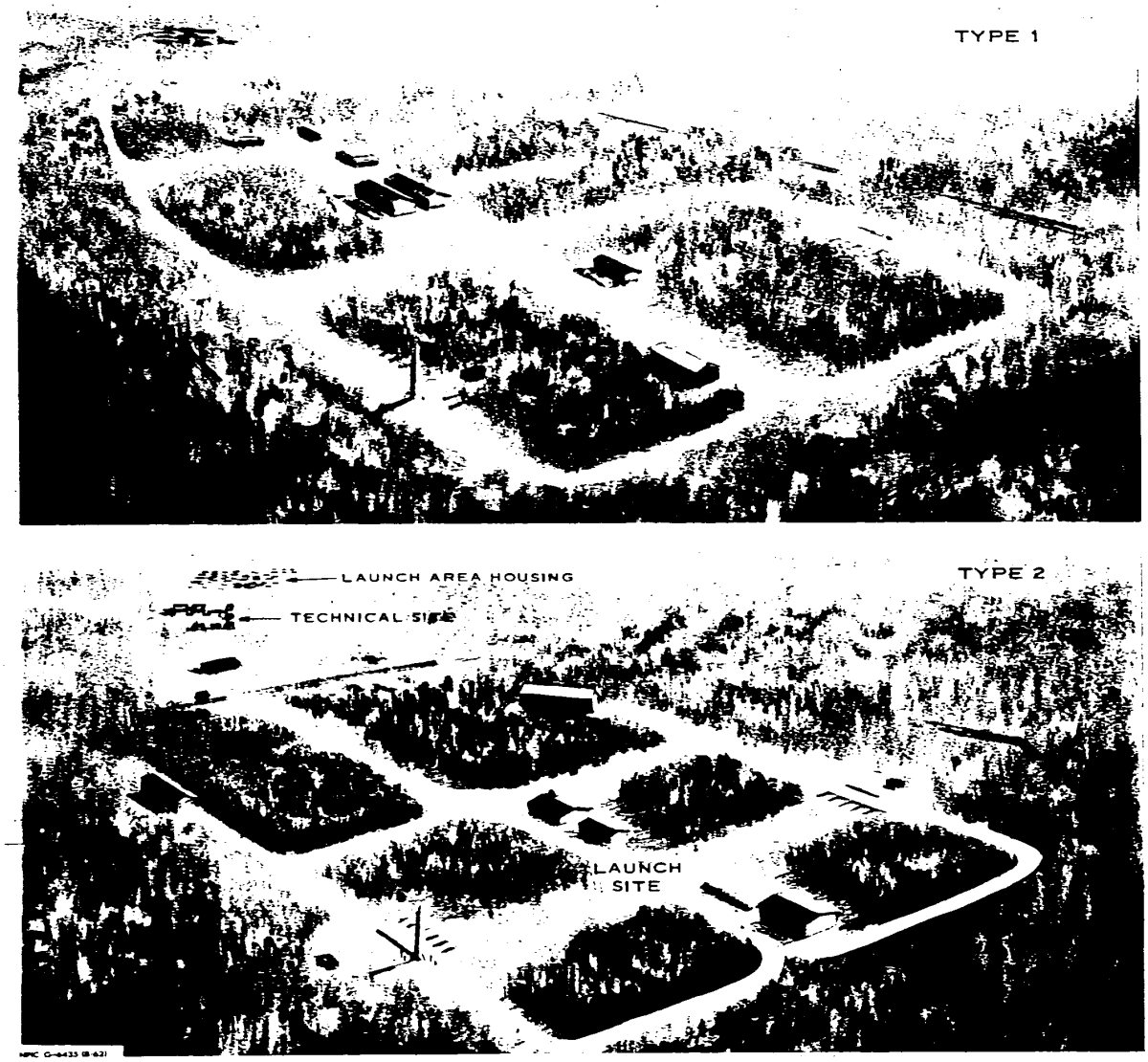


FIGURE 2. TYPICAL SOVIET ICBM LAUNCH AREAS, DEPLOYMENT SYSTEM II

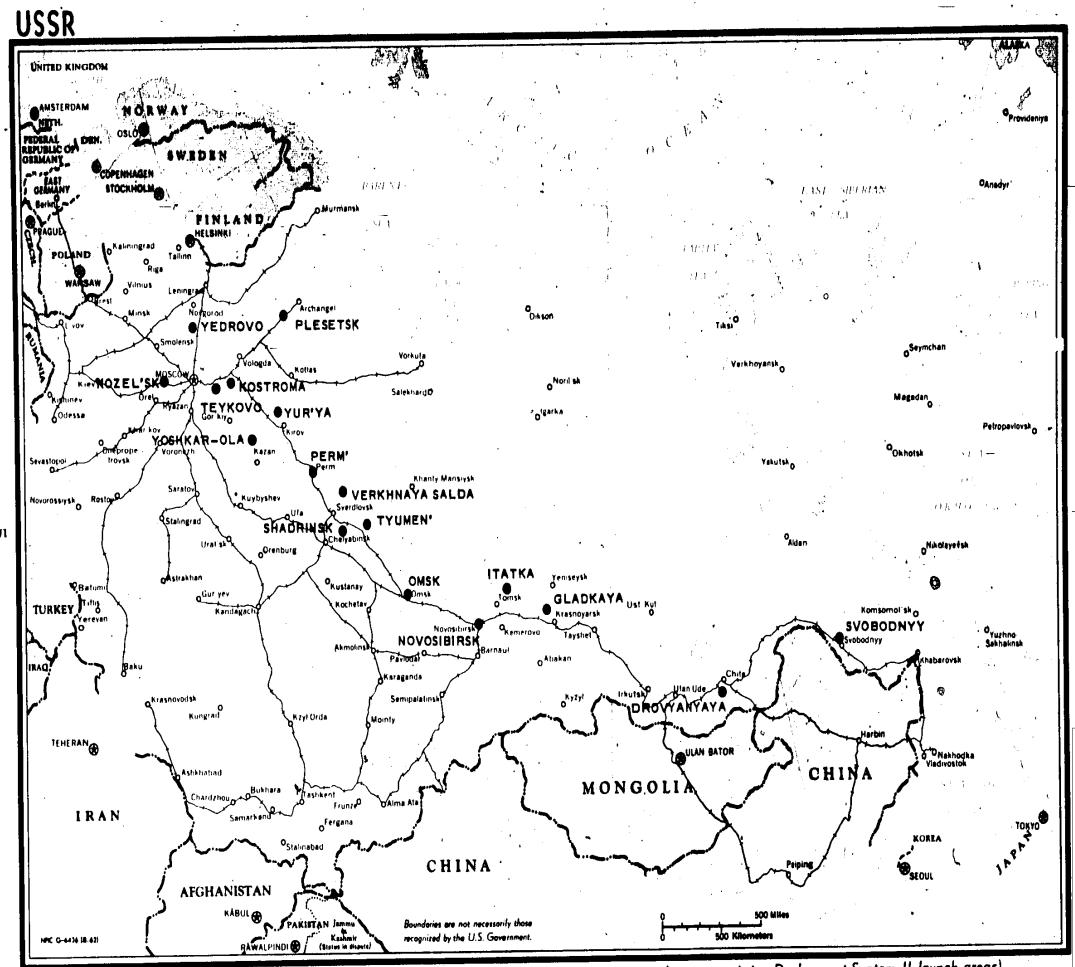
east along the Trans-Siberian Railroad. For locations of these 12 ICBM complexes, see Figure 3. Two DS-II launch areas also have been identified at the Plesetsk complex in the northwestern USSR. All the identified complexes are located below the permafrost line in well-drained terrain, and the locations are all within range of US targets on northerly trajectories.

The complexes are supported by rail line from the following cities or towns: Plesetsk (62-45N 40-15E), Yur'ya (59-14N 49-29E) near Kirov, Verkhnyaya Salda (58-02N 60-33E), Kostroma (58-00N 41-15E), Teykovo (56-52N 40-34E), Svobodnyy (51-24N 128-08E), Yoshkar-Ola (56-40N 47-55E), Itatka (56-50N 85-36E) near Tomsk, Perm' (58-00N 56-15E), Drovyanaya (51-35N 113-02E) near Chita, Yedrovo (57-55N 33-38E), and Novosibirsk (55-02N 82-25E).

2. Major Elements

A DS-II complex consists of the following three major elements: a complex support base, a rail-to-road missile transfer point, and a number of launch areas. (As many as five DS-II launch areas have been identified at a single complex.) Such a complex is supported by a rail spur which serves both the support base and the transfer point. The launch areas are served by good-quality roads with wide-radius turns which lead from the transfer point to each of the launch areas. Similarities between these launch areas and Launch Area C at Tyuratam indicates that they are designed for the second-generation SS-7 (Category B) ICBM.

At five complexes (Plesetsk, Verkhnyaya Salda, Yur'ya, Kostroma, and Novosibirsk), launch areas of a significantly different configuration, characterized by a large excavation, have been observed under construction. The missile system to be deployed at these launch areas is not known. The activity may involve the introduction of a new weapon system (for example, SS-8 or an as yet unidentified system) into DS-II complexes, or a new deployment mode for the SS-7 with hardening of the launch sites. The introduction of the new system may replace some of the DS-II launch areas originally planned for these complexes.



29739 3-61 FIGURE 3. LOCATION OF SOVIET ICBM LAUNCH COMPLEXES. (Red indicates complexes containing Deployment System II launch areas).

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3. Layout

The relationship of the three basic elements of a DS-II complex is generally consistent. The support base may be found near urban areas or existing industrial facilities, although distances separating them may vary from 1.5 to 21 nm. When completed, the support base and the missile transfer point are connected by both rail and good-quality road. Direct road may connect the support base and the launch areas or access may be provided from the transfer point.

The rail spur serving the complex terminates at the transfer point. The transfer point may be adjacent to or within 1 or 2 nm of the support base; however, at Yur'ya and Kostroma these facilities are separated by 8 to 10 nm.

The launch areas are located along a good-quality service road that extends from the transfer point. The launch areas generally are separated by 3 to 5 nm and are situated in uncultivated, usually forested terrain.

4. Air Defense and Physical Security

As many as four SA-2 sites have been identified as defending seven of the DS-II complexes located in isolated areas. In some instances, however, the complexes lie within the SAM defenses of neighboring cities. Although the selection of forested terrain for the location of launch areas has provided protection from ground observation, no apparent attempt has been made to camouflage the complexes or to conceal them from aerial observation.

B. Launch Areas

The number of DS-II launch areas identified at each of the 12 complexes varies from 1 to 5. Each launch area is composed of the following three primary facilities: A launch site, a technical site, and a housing facility.

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1. Launch Site

At each launch area, a road branches from the main service road and leads directly to the launch site. The launch site occupies a rectangular area that is somewhat larger than 2,000 feet on a side and is enclosed by a double or triple security fence. The road within the site forms a loop pattern with wide-radius turns that passes through the two pad areas. This road, with secondary loops and cross connections, link the two pads with each other and with other facilities directly associated with the pad.

Two basic configurations (termed Type 1 and 2 and illustrated in Figure 2*) have been identified for DS-II launch sites. The principal difference apparent between the two types appears to be the positioning of the two missile-ready and prelaunch storage buildings. At Type 1 sites, these buildings (approximately 170 by 105 feet) are parallel and are situated on a concrete apron along the center road. At Type 2 sites, the corresponding buildings are located to the rear of the launch pads and are not road-through. At all Type 2 launch sites (with the exception of two at Verkhnyaya Salda), where the stage of construction and quality of photography has permitted measurement, these two buildings are different in width (170 by 125 feet and 170 by 105 feet) with the wider of the two buildings canted 25 to 35 degrees from the long axis of the pads. The variation in size of these buildings and their alignment with the pads probably indicates a difference in function between them which is as yet undetermined. At two launch areas at Verkhnyaya Salda, the larger buildings are canted only about 5 degrees.

Type 1 launch sites are located only at Launch Areas A and B at Yur'ya, Launch Area A at Plesetsk, and Launch Areas B and C at Verkhnyaya Salda. These sites represent the earliest configuration for DS-II. All Type 1 sites were identified at launch complexes either in an advanced stage of construction or completed, whereas during the same period, construction of Type 2 sites was only being initiated or was in relatively early stages of construction. Moreover, the Type 1 sites at Plesetsk and Verkh-

*P. 3, above.

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nyaya Salda are located near rivers or streams, indicating that these launch areas may have been originally selected and surveyed for the deployment of the first-generation ICBM system (SS-6), which probably has such a requirement.

Possible electronic facilities have been identified at both Type 1 and Type 2 sites. At the two Type 1 sites at Verkhnyaya Salda, a road leads off to two small cleared areas containing unidentified objects. The clearing associated with the left launch pad is aligned directly behind the pad, and the clearing behind the right launch pad is slightly offset to the right. Photographic coverage of Type 2 sites at Kostroma and Teykovo has revealed a building in the center of the launch site and parallel to the center road apparently equipped with a 15- to 20-foot radome. This structure may serve as part of the guidance system, or if DS-II uses a missile with all inertial guidance, may be part of a telemetry system intended to determine the reliability of the missile in flight.

Other facilities appear to be common to both Type 1 and Type 2 sites. A bunkered structure located forward of the guidance building and also parallel to the center road is believed to be the control center. It is located midway between the launch pads with scars between the pads passing on both sides of the building. Other structures of undetermined function have been identified in the central area.

The actual launching positions consist of two flat concrete pads approximately 350 to 400 feet long, separated by approximately 1,000 feet. Whenever the quality of photographic coverage has been adequate and the stage of construction has been sufficiently advanced, an object or structure has been identified on the launch pads. This structure probably is a fixed piece of equipment used in erecting and/or servicing the missile prior to launch. There is some evidence at Launch Area A of the Yur'ya complex that facilities such as vehicle stalls may be located under the pad area. At Kostroma and Teykovo, however, probable bunkered vehicle revetments have been identified to the outside of the launch pads.

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2. Technical Site

The identification of a technical site for final weapon processing is based on both photography and reliable collateral information. At launch areas in the middle or late stages of construction, a group of buildings believed to be the technical site has been identified off the access road leading into the launch site. A road with wide-radius turns leads into area where there are a number of warehouses and smaller buildings. In some instances, one or two larger buildings have been identified that appear to be directly served by a road containing a return loop. The initial checkout of the missile probably is carried out in this area, and it may serve as the final assembly point for missiles and warheads. The mating of the warhead to the missile is done either here or in the missile-ready and prelaunch storage buildings at the launch site.

3. Launch Area Housing

A third area located off of the access road or off the main service road consists of a group of barracks-type (approximately 160 by 40 feet) and smaller buildings. This area houses the on-duty personnel at the launch area. An additional group of structures serves as a camp for construction personnel at launch areas in the early and middle stages of construction.

C. Complex Support Base

1. Main Rail Head

The support base usually is one of the first identifiable features of a launch complex and, during the construction stage, serves as a base for buildings supplies and material for the remainder of the complex. Its location does not appear to be affected by security factors, because some of the bases are located near large cities and main highways. The facility is not unique to DS-II complexes. A similar installation has been identified at ICBM complexes of a different configuration, and its pattern of multiple

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rail spurs forming a yard is similar to that found at some rail-served industrial facilities and storage areas.*

When the complex is completed, the rail yard serves primarily as the unloading depot for supplies, fuel, and other material and as a storage and maintenance center for the entire complex. The method of road and rail access (see Figure 1**) and the absence of wide-radius turns indicates that it is not a weapons-handling area.

2. Supplementary Rail Head

A second rail-served area has been identified at Kostroma, Verkhnyaya Salda, and Yur'ya. At Kostroma, this area is located approximately 10 nm from the main support base, near the rail-to-road missile transfer point, and is served by two parallel rail sidings. The warehouses and barracks-type buildings located at this point probably provide additional support to the complex for the unloading of supplies and material. At Yur'ya, the rail spur supporting the complex terminates in three sidings approximately 8 nm north of the support base. One of the sidings terminates in the missile transfer point, and the other two sidings provide service for areas on either side of the transfer point. At Verkhnyaya Salda, the supplementary rail head is located on the service road between Launch Areas D and E. The presence of a housing area, an open storage area containing piles of material, and a probable concrete batching plant indicate that this rail head is a construction and/or logistic support facility.

3. Housing and Administration Area

A large area of barracks, family-type housing, and administration-type buildings is also associated with the support base. The size of this area varies among complexes, probably reflecting varying stages of construction. The housing and administration areas at Plesetsk and Verkhnyaya Salda are believed to be complete and contain more than 100 barracks-type buildings and more than 50 smaller buildings. At the Yur'ya

*For detailed characteristics of the support base, see CIA/RR EM KH 62-1, April 1962.
**Facing P. 1, above.

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complex, approximately 75 barracks-type structures have been identified, whereas at Kostroma, Teykovo, and Perm', approximately 30 to 40 barracks-type buildings are apparent. This area is the primary housing facility for the complex.

D. Missile Transfer Point

A rail-to-road missile transfer point, or the probable site where this facility will be located, has been identified at all DS-II launch complexes. There are substantial differences in the location of this point and in the facilities associated with it. The transfer point may be located from 1 to 10 nm from the support base. Security factors appear to have caused the placement of this facility separate from the support base and urban areas where numerous people would be able to observe activity. These elements are separated by approximately 10 nm at Kostroma and 8 nm at Yur'ya, where the transfer point contains extensive support facilities including a number of storage buildings, open storage areas, and a housing area, in addition to the other rail sidings discussed above.

A typical road and rail pattern is evident at all identified transfer points. An improved road enters the transfer point from the launch areas, parallels the rail spurs, and forms a turn-around with a curve of approximately 150-foot radius before it joins the main road in a wide-radius turn. One or two cross-connections with wide-radius turns extend from the rail line across the loop road. At some complexes, the transfer point consists of a loop road between the rail spur and the main road with wide-radius turns at either end. Differences observed in the road and rail pattern are minor and may be the result of varying stages of construction or the quality of photographic coverage.

The facility and equipment used for transfer of missiles from rail-to-road have not been identified at the operational launch complexes; however, some detail is available on Launch Area C at Tyuratam. At Tyuratam a dead end spur off the main spur leading into the launch area terminates at an L-shaped projection of a loading dock which lies between the dead end

[redacted] 25X1

spur and the main spur. The dock is [redacted] with a projection [redacted] 25X1
[redacted] on the north side of the east end, providing an over-all width at the 25X1
east end of about 45 feet. The east end of the loading dock slopes down, and a road provides a connection between this end of the loading dock and the main access road to the launch area. At several of the deployed launch complexes, two to four buildings of undetermined function appear to be associated with the loop road of the transfer points.

The location and simplicity of the transfer point indicates that its primary function is the secure transfer of missiles. This facility also may be used for the transfer of propellants. Warheads probably are brought into this area and transferred, but it has not been determined whether they are stored centrally in the complex or shipped directly to the launch areas by road.

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APPENDIX A

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